

## **Switzerland**

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SWITZERLANDSTANDARDS

Reference No.	Standard No.	Title
CH1	SIA 180	Thermal protection of buildings Warmeschutz im Hochbau
CH2	SIA 331	Windows Fenster
CH3	SIA 380/1	Building energy performance Energie im Hochbau
CH4	SIA 382/1	Ventilation and AC Plants, technical requirements Luftungstechnische Anlagen, technische Anforderungen (Draft)
CH5	SIA 382/3	Ventilation and AC Plants, procedure to get permission to install cooling and/or humidification devices. Luftungstechnische Anlagen, Bedarfsnachweis
CH6	SIA 384/2	Heating load calculation Wärmeleistungsbedarf von Gebäuden
CH7	SWKI 85-1	Ventilation installations in indoor swimming pools Luftungsanlagen in Hallenbadern
CH8	SIA 384/1	Central heating plants, water heating systems Warmwasser-Zentralheizungsanlagen
CH9	SIA 380/7	Haustechnik

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Besides the standards mentioned above there are standards applicable to some specific room types, as the one on swimming pools or the rules for the ventilation needs of garages or working rooms. The list of standards is not exhaustive and planners use, in many cases, the relevant German VDI rules, as these standards are much more refined.

Recent years have been productive in a creation of standards in this field. These activities have been supported by the efforts to save energy or by the needs of improving room air quality

Figure 1. Overall leakage of the building, openings closed

	nL 50-Values h-1	
	Lower Limit	Upper Limit
Single family home (with window ventilation)	2	4.5
Multi family home (with window ventilation)	2.5	3.5
New Homes with exhaust ventilation	2	3
Buildings with balanced ventilation or AC plants	-	1

The values or value ranges above are meant for a medium wind exposition of a building. In severe wind expositions or in strongly sheltered positions it is recommended for the first 3 categories to verge towards the appropriate ends of the ranges.

For buildings with window ventilation, where the leakage is lower than the lower end of the range, provisions have to be made, to guarantee the necessary basic ventilation rate.

In buildings with exhaust ventilation appropriate inlet openings have to be planned, in order to guarantee an appropriate ventilation of all necessary zones.

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Figure 2. Air Leakage (SIA 331)

Group	A	B	C
Pressure in Test in Pa )	150	300	600
Building Height in m )	0..8	>8...20	>20..100
<b>Requirements:</b>			
Max a-value [m <sup>3</sup> ]/hm. (2/3) Pa]	0.2	0.2	0.2
V max at test cond. [m <sup>3</sup> /h.m.]	5.65	8.95	14.25

Figure 3. Recommended Ventilation Rates Per Person (SIA 382/1)

Room type	Smoking	Recommended Outside air rate per person [m <sup>3</sup> /hr.Pa]
Schools	Prohibited	12-15 (1.15%CO <sub>2</sub> )
Offices	Prohibited	25-30 (0.10%CO <sub>2</sub> )
Offices	Yes	]
Open plan offices	Yes	]
Shops	Prohibited	12-15 (0.15%CO <sub>2</sub> )
Theatres, concert halls	Prohibited	25-30 (0.10%CO <sub>2</sub> )
Hotel rooms	Yes	30-70
Conference rooms	Yes	
Restaurants	Yes	40-50
Hospital (bedrooms)	Prohibited	20-50

Recommendation of a basic air change rate of 0.3 h in unoccupied rooms or rooms with low occupancy.

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Each canton and several cities have their own building and energy codes, which differ in content and style.

There is no legal possibility for the Swiss Government to implement federal building laws. Nevertheless, there are trends to cooperate in connection with the development of codes, on one side between different cantons and on the other side between engineering associations and governmental bodies.

Voluntary codes of practice in the field of ventilation are issued by the following organisations:

- a) Swiss Standards Association.  
Schweizerische Normenvereinigung (SNV)
- b) Swiss Society of Engineers and Architects  
Schweizerischer Ingenieur - und Architektenverein (SIA)
- c) Swiss Association of Heating and Cooling Engineers  
(affiliated with ASHRAE)  
Schweizerische Warme - und Klimatechnik (SWKI)
- d) Swiss Institute of Public Health and Hospitals  
Schweizerisches Institut für Gesundheit und  
Krankenhauswesen

The following summaries of standards will show that there has been an intensive development in the last few years.

### Summaries of the main Standards

- SIA 180 deals with thermal protection, comfort and condensation problems for all seasons. Main issues with respect to the ventilation and leakage problems are:
  - proper definitions of the key words in this field
  - general guidelines for adequate ventilation
  - provisional recommendations for  $N_{L50}$  - values  
(see Figure 1).

First experience with the application of  $N_{L50}$  - values shows that these values would need some refinement, especially in cases where different parts of the building shell differ considerably as to their leakage.

- SIA 331 contains upper limits for the leakage values of windows. In earlier versions of SIA standards this so called a-value (leakage value) varied according to the height of the building where the window would be used. In the recent editions there is only one value for a (0.2m<sup>3</sup>/h m Pa<sup>2/3</sup>). (Figure 2)

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Experience shows that new windows are easily 10 times tighter than this value; this prohibits in many cases a certain basic ventilation.

The new energy performance Standard 380/1 is basically a calculation procedure for the determination of the energy consumption of a building. The calculation has to be executed in the design stage. As an exception, small buildings may be designed by fixing some specific limit values (heat transfer coefficient, window - a - value) instead of the complete calculation. The building permit is based on reaching a certain energy consumption and some minimum efficiency for the plant inclusive of the distribution system.

For ventilation there are certain "standard ventilation values" inserted in the calculation, either for natural or for mechanical ventilation.

As a definite change, SIA started in the last few years to issue ventilation standards. The first 2 of the 3 expected standards have been printed in spring 1989 as drafts.

Standard 382/1 contains all major requirements of a ventilation/AC plant. One of the most interesting parts is a table of recommended ventilation rates for different room types (see Figure 3).

The second Standard (382/3) contains a method to check the need of installing cooling and/or humidification devices for certain buildings and uses. This standard is an important instrument to be applied, in order to get a building permit for these installations.

The so called "Heizlastregel" (SIA 384/2) contains a procedure to calculate the ventilation losses for the winter design situation. There is a rule, that either ventilation losses induced by windows or at least an air change rate of 0.3 h (in cases with very tight windows) have to be inserted for this design condition. This does not mean that air change rates will not be higher during the whole winter season.

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